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ABSTRACT

A theoretical analysis is presented of the problem of carrying out meaningful research into programmed language instruction. This is an attempt to develop a paradigm of research through the isolation of eight critical areas which must be taken into account before valid information can be obtained. The critical areas are: experimental design, programming variables, programming strategies, media of instruction, administration, parallel teacher-led instruction, statement of objectives, and evaluation of achievement, and measurement of attitude and motivation. The establishment and analysis of the critical areas is intended as the foundation work for a model of research in this field. (Author)

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Colin Black

Towards a research model for the investigation of programmed language instruction

6/1975

TOWARDS A RESEARCH MODEL FOR THE INVESTIGATION OF PROGRAMMED LANGUAGE INSTRUCTION

Colin Black

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1. INTRODUCTION

In the early 60's, foreign language instruction appeared to be one of the more promising fields of application of programmed learning. Lane (1964), for example, enthusiastically pointed to the fortunate coincidence that language teachers had at their disposal a theory of language (structurual linguistics) that told them what to teach and a theory of behaviour (behavioral psychology) with its allied technique of teaching (programmed learning) that told them how to teach. In addition, there was a technology available (that of the language laboratory) which had been developed within the theoretical framework of both structural linguistics and behavioral psychology.

Ten years later, this enthusiasm is no longer discernible in the literature. The fundamental assumptions of structural linguistics have been put into question by an alternative theory of language (transformational grammar), the body of psychological knowledge that has previously been available to language teachers through their professional literature (e.g. Rivers, 1964) has been criticised (Carroll, 1966) as being several decades behind the actual state of present psychological knowledge, and the technological synthesis of linguistics and psychology in the language laboratory has developed to a great extent outside the sphere of influence of programmed learning (Roeske, 1966; Bung, 1969).

It might be supposed that research into programmed language instruction had played a guiding part in these developments. Unfortunately, this does not seem to have been the case. Projects of programmed language instruction have been carried out and reported (overview in Ornstein, 1971), but these studies have not yielded an organized body of information that could guide developments in language teaching.

Research has an important part to play in the development of language teaching, namely that of providing an alternative to pure opinion in debate. In the case of programmed language instruction, research does not appear to have made this contribution. There is now a possibility that programmed language instruction could be abandoned in teaching practice without experimental evidence having been gathered as to its strengths and weaknesses. This would be regrettable from a number of points of view, not least because of the interesting development of cyclical programming, a

programming strategy unique to language instruction (Carroll, 1963; Howatt, 1967).

Conversely, programmed language instruction may have its own important fuction for research. The language learning situation represents an extremely complex research problem, one of its least controllable features being the teacher. Programmed language instruction presents the researcher with the possibility of studying the other variables in the language learning situation with the teacher factor either removed or controlled. In this way, insights may become available through the study of programmed language learning that are of interest and importance to language teaching generally.

A critical review of some studies in programmed language instruction by Black (1974) suggested that there are a number of critical areas for research of this kind which are frequently not given adequate attention by investigators. The analysis of these critical areas is developed in the present study, the general aim of which is to provide the foundation work for a model of research in this area. The existence of a model for the investigation of programmed language instruction would mean that during a project of programmed instruction account could be taken of all factors having an important influence on the course of language learning, either by controlling these variables or by incorporating them into the design of the investigation.

The critical areas cover three aspects of research:

Design of investigation (Chapter 2)

Components of the learning situation (Chapters 3 to 7)

Measures of outcomes (Chapters 8 and 9).

Chapter 2 attempts to present a synthesis of all the critical features analysed by sketching a preliminary model in this field. At this stage, the outline of such a model can only be tentatively suggested, but as a concrete proposal a full model for one typical investigation, the study of media effects, is presented.

Chapter 3 begins with a schematization of instructional process variables relevant to language programming and proceeds to analyse each category (input variables, intermediate process variables and output variables) of the scheme in some detail.

Chapter 4 critically examines the two major programming strategies (linear and intrinsic programming) in respect

to their relevance of application to language instruction.

Chapter 5 classifies the components of single-medium and multi-media technology available for language instruction and proposes a systematic description of media as part of the language learning environment.

Chapter 6 analyses five variables in the administration of programmed instruction: study directives, pacing of instruction, study time, mode of supervision, incentive measures, while Chapter 7 discusses formal and informal teacher participation and the influence of this participation on learner motivation.

Chapter 8 approaches the question of evaluation of achievement on language programmes through the analysis of goals and objectives of programmed language instruction. Only when specific language teaching objectives are stated can evaluation determine the success of the programmed instruction. The contribution made here to the problem of stating language teaching objectives in an adaptation of the Taxonomy of educational Objectives (Bloom, 1956) to language instruction.

Chapter 9 outlines three areas of attitude study relevant to investigation of programmed language instruction: attitude towards the programme, attitude towards language learning, attitude towards the target language and its culture.

Definition of terms

Concepts used in various places in the present essay which allow some latitude of interpretation are defined in this section. As some knowledge of general linguistics is assumed throughout, well-established linguistic terms are not defined here. The reader without this knowledge is referred to Lyons (1968). Similarly, the basic terminology of programmed learning is not defined here, and the reader is referred to Markle (1964).

Audio-lingual method

An application to language teaching of principles of structural linguistics and behavioral psychology. Among its key tenets are:

> Language learning is the formation of a set of correct habits. These are appropriately acquired by drilling the structures or patterns of the target language.

The spoken language is primary, the written language secondary. Hence, an appropriate order for the learning of language skills is: listening and speaking before reading and writing.

The language learner should find his own "rules" of grammar inductively, by generalization from a learned model response (pattern).

Installation

An instructional device fixed in a particular location.

Instrument

A device that presents instructional material.

Position

A language laboratory booth with its individual audio instrument.

Proactive control

Control over the type or extent of activity that the learner is to engage in during performance of a learning task.

Retroactive control

Control over the type or mode of response that the student is expected to exhibit after performance of a learning task.

Structural linguistics

A theory of language which states that any language consists of a finite set of words (its lexicon) and a finite set of structures or patterns within which the lexicon can be arranged. The sound system of a language is likewise analysed in terms of a set of structures of a set of minimal sound units (phonemes).

2. EXPERIMENTAL DESIGN FOR INVESTICATIONS OF PROGRAMMED LANGUAGE INSTRUCTION

The aim of this chapter is to provide guidelines for the integration into a research design of the critical areas developed in the following chapters, namely programming variables, programming strategies, media, administration, parallel teacher-led instruction, evaluation of achievement and measurement of attitude.

The survey of investigations (Chapter 2) indicates how complex is the area of investigation involved in research into programmed language instruction. Investigators have frequently failed altogether to take account of one or more variables or have neglected to investigate possible interaction between variables.

Language teaching research in general has been criticised (Carroll, 1966) for a lack of rigour in the design and conduct of experiments that would not be accepted in other research fields. Indicative of the relative lack of attention given to research design in this field is Pimsleur's (1957) contribution to the problem of design in language teaching research, which summarizes generalia of experimental design but mentions no problems specific to the investigation of language teaching. Rigorous criticism of the design of the Pennsylvania Project (Aleamoni & Spencer, 1969; Clark, 1969) suggests that more stringent requirements may be made of future research.

Two problems in achieving a rigorous design for the investigation of programmed language instruction are identifying and arranging the many variables obtaining in the language learning situation concerned. The remaining chapters of this essay attempt to identify the characteristic variables of this field; the task of the present chapter is to suggest solutions of arrangement. Both simple and factorial designs are considered.

For a simple design, the critical areas analysed in chapters 3-7 provide an overview of possible independent variables and of variables to be controlled. That is, after selection of the independent variable, all the variables identified, where relevant, are to be controlled. The critical areas of chapters 8 and 9 are outcomes or dependent variables.

A simple design may be appropriate for the investigation of programming variables. In this case, an alternative to control of certain other variables,

such as media, is to integrate these variables into the theoretical concept. For example, a specific programming variable, independent variable A, may require a corresponding presentation device that differs from that required by independent variable B, a contrasting programming variable.

Simple design precludes the investigation of interaction, which, given the complexity of the language learning situation, will very often represent important information. As an illustration of the way in which the present analysis of critical areas may serve a function in constructing effective factorial designs for investigations of programmed language instruction, a model is presented in Figure 1 for the investigation of media variables. The model is intended to serve as a basis for the planning of a factorial design for this area.

It is suggested that the construction of a series of models of this kind, calling upon variables in all the critical areas analysed, would be the foundation work for an encompassing model of research into programmed language instruction.

No consideration is made here of aspects of design (matching, randomization, etc.) that have no specific reference to the field in question, even though previous investigations in the field have often neglected fundamental questions of design pertinent to all educational research (compare e.g. Best, 1970 with the investigations surveyed by Black, 1974).

The selection of independent variables remains a difficult problem for this area. Many studies here, as with programmed instruction generally, have chosen to compare programmed and conventional language instruction as independent variables (mode of instruction). It must be stated that the concept of a research model envisaged here cannot cope with such a complex comparison. Attempts of this kind are, in the writer's view, premature. A great deal of information is needed on factors such as programming variables that are small parts of the entire complex but which may be of decisive importance for the understanding of language learning processes. Hartley (1966) reviewed 112 comparisons of programmed and conventional instruction. He noted that 37 % of these found programmed instruction superior and 14 % conventional instruction, but as many as 49 % showed no significant differences, a finding that may support the view expressed above.

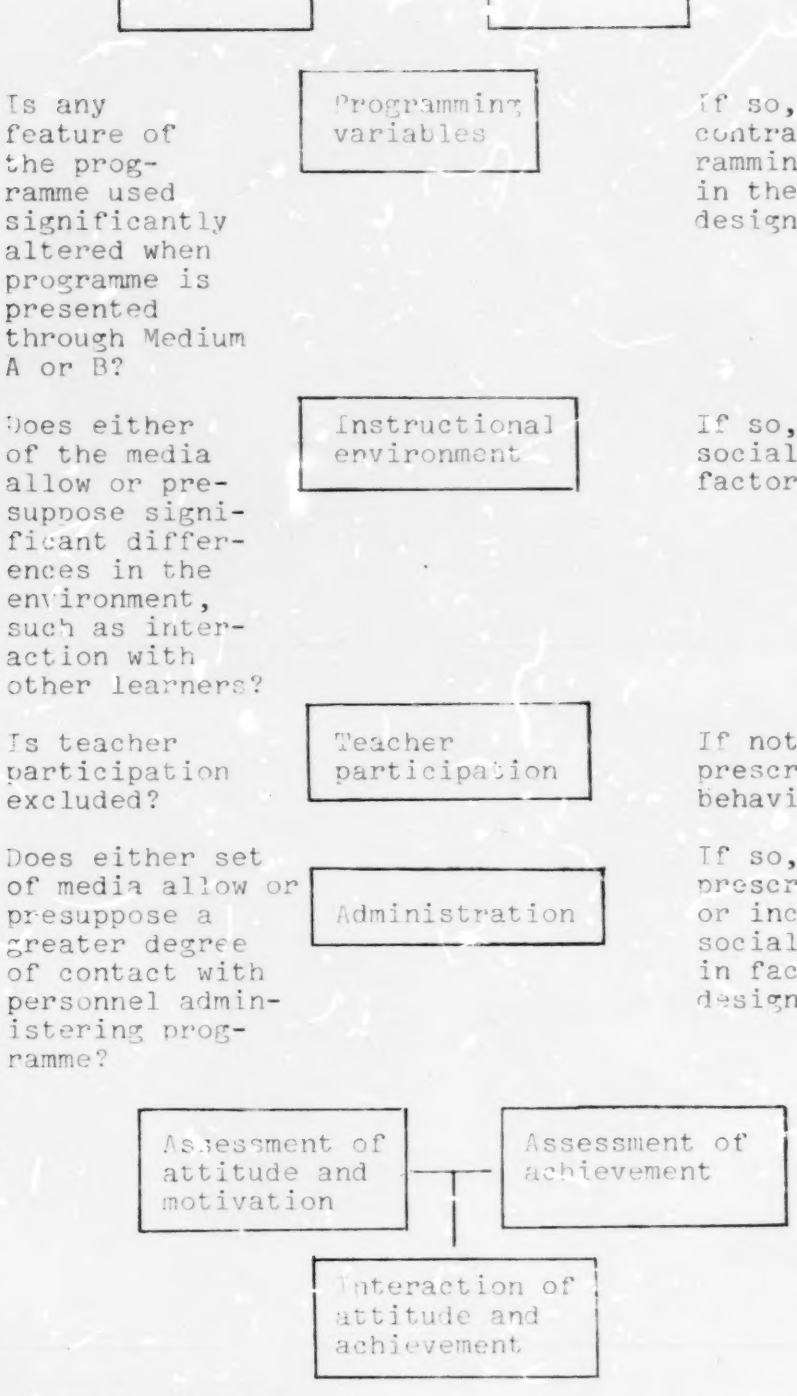
Programming variables
Is any feature of the programme used significantly altered when programme is presented through Medium A or B?
If so, incorporate contrasting programming variables in the factorial design.
Instructional environment
Does either of the media allow or presuppose significant differences in the environment, such as interaction with other learners?
If so, incorporate social factors in factorial design.
Teacher participation
Is teacher participation excluded?
If not, closely prescribe teacher behaviour.
Administration
Does either set of media allow or presuppose a greater degree of contact with personnel administering programme?
If so, either prescribe behaviour or incorporate social contact in factorial design.
Assessment of attitude and motivation
Assessment of achievement
Interaction of attitude and achievement
Is an attitudinal effect discernible independent of achievement in respect to either of the media?

Figure 1. Model for the planning of a factorial design in the investigation of media effects.

3. PROGRAMMING VARIABLES

Research into programming variables is concerned both with characteristics of single variables and with their relationships to the entire instructional process in which they appear. Accordingly, the discussion of individual variables that follows is preceded by a schema of the instructional process in which programming variables are systematically placed.

Accounts of the instructional process in the language of systems use the terms input and output in a way that permits confusion with the use of the same terms in a cybernetic context. As the scheme to be presented is based on a cybernetic model, these two models of the instructional process are elucidated in Figures 2 and 3.

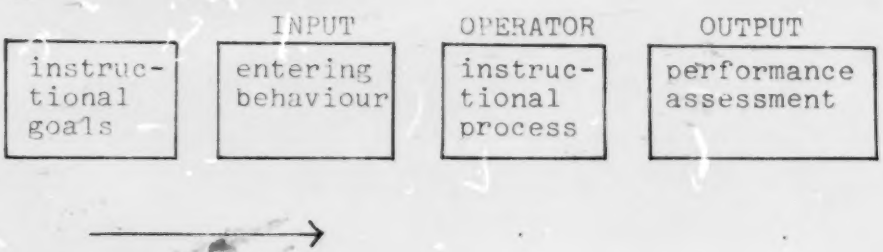

Figure 2. The instructional process as a systems analogue.
After Glaser, 1962.

Feedback loops are omitted from Figure 2.

In the latter terminology, input and output refer to elements of instruction, in the former to states outside (before or after) instruction. The following schema, built upon a suggestion of Landa (1968), incorporates programming variables into three stages of instruction corresponding to the units of the teaching algorithm of Figure 3.

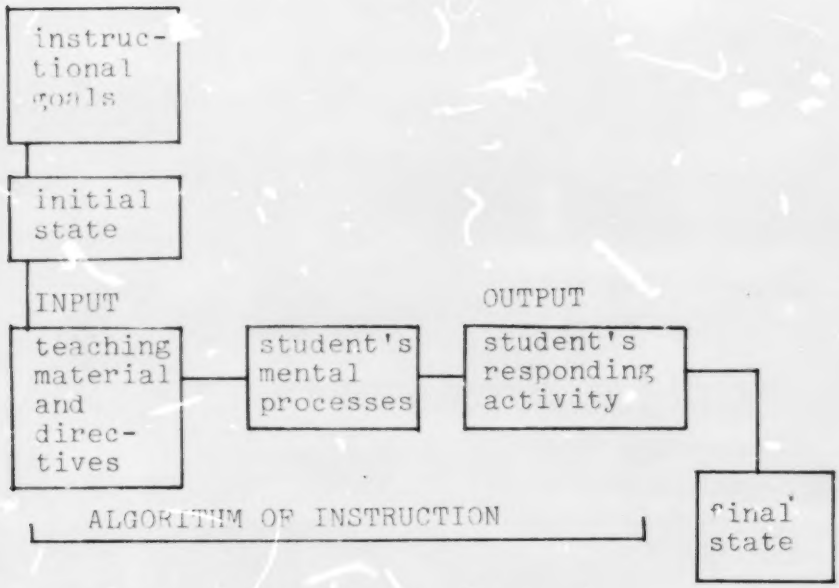

Figure 3. A cybernetic view of the instructional process.
After Landa, 1968.

Table 1. A classification of programming variables applicable to programmed language instruction.

INPUT VARIABLES
Presentation of information.
Setting a task or problem based on information presented.
Advance help with the task or problem, e.g. organizing or limiting the manner in which the student will seek a solution to the task.
INTERMEDIATE VARIABLES
Control over the student's mental processes.
Proactive control (through type of task selected).
Retroactive control (through mode of response required).
OUTPUT VARIABLES
Giving model responses or correct answers
Re-ordering the student's approach after he has given an unsatisfactory response.

The items of the above framework are now discussed in some detail.

3.1. Input variables

Presentation of information

New language material may be presented audially, audio-visually, visually, through paradigm, through explanation or through comparison with the native language. Research on task analysis lines (Miller, 1962) could elucidate the procedure of presentation most appropriate for teaching the various facets of language ability.

Variety in presentation has been indicated in studies with other subject matter, notably Gagné & Bassler's (1963) study with geometry instruction. They concluded, tentatively, that narrowing of generalizability (lack of variety) reduces effectiveness of learning. This finding should be tested with language material. A sceptical interpretation of Gagné & Bassler's study is that when the learner's experience is neither controlled nor understood, accidental learning is more likely in a variety of presentation.

Sequencing of presentation, which has been pronounced the most important single variable in the instructional process (Gagné, 1965), should properly be considered together with the specification of objectives. Mager's (1961) suggestion for taking account of the sequence of instruction most meaningful to the student should be acted upon in language teaching research. This suggestion has important implications for the motivation of students working with self-instructional materials.

How intensively new matter should be introduced (so-called "size of step") is not likely to be elucidated by gross comparisons of small step/large step sequences of the same material such as the study of Coulson & Silbermann (1960), who combined small steps from Holland & Skinner's (1961) programme into larger steps and tested the result against the original. Rather, information should be sought from student responses or through interview as to steps appropriate both for the individual student and for the type of language material presented.

Setting a task or problem based on material presented

Tasks should be relevant both to information presented by the programme and to the kind of mental processes aimed at in the instruction. Relevance of the task to the information presented can be tested by Holland's "blacking out" technique, in which subjects are asked to perform tasks after parts of the frame have been blacked out (Holland, 1969).

Type of task is discussed in Section 3.2.

Advance help with the task or problem

In the psychomotor aspects of language teaching, variables in this class are concerned with the "shaping" of response and are thus usually found linked to procedures of reinforcement. Techniques of differential reinforcement relevant to language teaching are reviewed by Lane (1964). The work of Morton (1965) is a well-known application of these procedures to the teaching of pronunciation. The alternative to this approach is to develop in the learner a critical awareness of the central features of the skill he is learning, in other words, of the critical articulatory processes in the formation of a sound (Carroll, 1966).

In the other areas of language teaching, assistance with the task has the aim either of ensuring that the student's response will be correct (Skinnerian) or of ensuring that it will fall within a number of foreseeable alternatives (branching) or else of directing the student's thinking along paths that will enable him to produce a solution (mathetics). Variables of the last kind might, for example, call a student's attention to possibilities of implicit meaning in the language material.

3.2. Intermediate variables

Proactive control

The kind of task selected determines to some extent the kind or range of mental activity the student will engage in. Ideally, tasks selected should be indicated by experimental evidence as to the appropriate forms of mental activity for the learning of different aspects of language ability. These may range from paired-associate learning of lexical items to problem-solving in the interpretation and evaluation of complex language material.

In discriminating items of phonology, a relevant finding from studies on speech pathology is the utility of discrimination in a variety of tasks (Holland, 1965).

Retroactive control

The kind of response required also determines to some degree the student's mental activity. Research concerned with overt vs. covert responding is reviewed by Holland (1965). A finding of interest to language teaching is that overt responding is clearly superior to covert responding where the response itself is an objective of instruction. This is the case with the production of sounds.

From the point of view of control, overt responses are essential. They are almost the only source of information available as to the student's mental processes. Constructed responses are discussed in Section 3.3.

3.3. Output variables

Providing model responses or correct answers

When a model response to a task or a correct answer to a question is provided by the programme, what action is the student expected to take?

Many programmes using tape recordings adopt the four-phase drill model (task-student response-model response-student repetition of model response) in the expectation that appropriate learning will take place during this sequence. There is no guarantee that it will. The student is given no direct information about his performance; he may or may not acquire information through his own insight. Students may either not perceive any essential difference between their own performance and the model on the tape or else fail to comprehend the nature of the difference ("Something is different here, but what?").

Providing only model answers to questions may likewise leave the student in some bewilderment. He now knows that he was right or wrong, but not why.

To give support to "self-shaping" of this kind in the teaching of pronunciation, some programmers, like Valdman (1964), have provided preparatory work in discriminating sounds, using differential reinforcement. There is, however, no evidence that acquiring skill in discriminating enhances ability in self-monitoring (Lane, 1964).

Re-ordering the student's approach after he has given an unsatisfactory response

The enormous range of possible responses in all the productive area of language instruction makes the provision of a nuanced automated response to student performance hard to conceive. Classroom teaching integrated with the programme's sequence and individual guidance are alternative approaches. If a rough attempt is made to supply an automated reaction in this area, the consequent crudeness of prediction of divergent responses should be allowed for by providing opportunities for informal guidance and consultation.

The receptive area seems to offer better possibilities for control of student feedback, since the variety of

possible responses may be more limited. Responses can in some cases be predicted through recourse to contrastive analysis of the foreign and native languages. Divergent interpretation of particular spoken or written material could be investigated empirically, seeking information directly from students or through introspective techniques. This possibility does not seem to have been explored in language programming to date.

4. PROGRAMMING STRATEGIES

In large-scale investigations, individual programming variables are encountered as part of total programming strategies. A discussion of two major programming strategies follows, with special attention being given to the application and relevance of these strategies to the demands of language instruction.

4.1. Skinnerian programming

Each step of a Skinnerian programme is designed to establish a simple verbal or operant association (Skinner, 1960). Larger units of the programme establish strings of such associations. To what areas of language learning is this type of instruction appropriate?

Apart from the production and discrimination of sounds, all the sub-systems of language operate by making new relations between known items, not by reproducing learnt associations as such. In the receptive area, the listener or reader considers relationships for the most part not previously encountered between known phonetic, lexical and syntactical items. Let us call this contemplation, though it is performed at high speed, in order to stress the nature of the activity. In the productive area, the speaker or writer brings phonetic, lexical and semantic items into such relationships. In order again to stress the nature of the activity, let us call this search. For both these activities, Skinnerian programming provides inadequate preparation.

The exceptional case noted above was the discrete skills of sound production and discrimination. Here Skinnerian programming seems appropriate, and practical successes of such programmes (Morton, 1965) appear to support this assumption, though the large number of study hours required should not be underestimated. It is of interest that Morton's pronunciation programmes exclude meaning. The student is expected to acquire faultless sound production and discrimination in Spanish before he under-

stands the meaning of a single Spanish word (Morton, 1965).

These comments on Skinnerian programming are based on the assumption that the operative or communicative skills of language ability are the principal objectives of instruction in a foreign language. There are, however, teaching systems where the objectives do not embrace these skills. The Finnish school system, for example, has until recently through its matriculation examination ratified a complex of associative learning (numerous lexical items and prescriptive grammar rules) to which Skinnerian programming applies well. Observers of this system have commented that learners can barely speak, write or understand foreign languages after six to seven years of study (Hirvonen, 1971; Strømnes, 1972).

4.2. Intrinsic programming

Branching allows instruction in the meaningful operations of language. Characteristically, steps of branching programmes are larger and stress the activities of contemplation and search (Crowder, 1963) mentioned as essential features of language operations. Crowder's treatment of errors is also designed to lead to meaningful and purposeful operations within the subject matter, in the case of language the formulating and interpreting of messages. As errors made in using a foreign language can be of two kinds, those that interfere with communication and those that do not (Black, 1972b), there is the possibility that the programmer could ignore the latter type.

Nevertheless, as Landa (1968), criticising Crowder's treatment of errors, points out, until the mental processes are known that have caused a given error, correction of the error must remain a random control of learning. For an error can be caused by widely differing mental processes, just as indeed a correct answer can be obtained by inappropriate or incorrect mental processes. This is an important criticism; it implies that for language instruction the programmer must seek an understanding of the mental processes of language learning. Hopefully, work in psychology of learning, particularly verbal learning (overview in Postman & Keppel, 1969), and in psycholinguistics (overview in Rosenberg, 1965), will provide insight here; a synthesis of both is Rommetveit (1968). Landa (1968) proposes diagnostic programmes or alternatively diagnostic tests built into programmes in order to take account of the psychological sources of error. A similar suggestion has been made, independently of programmed instruction, by Ingram (1968).

5. MEDIA OF INSTRUCTION

The intimate connections between language and sound, language and vision (Corder, 1966) mean that the media employed in programmed language instruction form one of the central variables in investigation. That the role of the media is often disregarded is partly due to the general difficulty of accounting for crucial features of the learning environment. The likelihood in language instruction of an interaction between specific media and specific aspects of the subject matter accentuates this problem.

The single and multi-media available for language instruction are under such constant development that detailed listing here would not be practicable. Instead, a schematic representation of basic channels and their combinations is given in Table 2, which also provides examples of specific media or instruments.

Table 2. A classification of single medium and multi-media technology for programmed language instruction.

Channel	Media/Instruments
text	programmed book, simple roller-type teaching machine
sound	tape or disc recordings
sound and text	synchronized tape, language laboratory
sound and pictorial material	more complex teaching machines, e.g. BASF Lehrsysteme
pictorial material and text	illustrated programmed book
pictorial material, text and sound	multi-media complexes, e.g. ERE talking typewriter, computer-aided instruction
moving pictures and sound (and text)	closed circuit television, film, animated cartoon

Until means are developed for quantifying the influence of media variables on the outcome of instruction,

investigators can only give a meticulously accurate description of the learning environment. Thus, account of the media in operation during the course of an investigation should meticulously note imperfect functioning of instruments, difficulty of access to equipment, or unfamiliarity with its use.

When, for instance, the language lab. is used as a medium of instruction, attention should be paid to the type and condition of the installation and equipment. This feature could be investigated in detail through observation records, such as lab. logs, and questionnaires. Some questions of detail that may be crucial are:

> How readily available are the language lab. positions for library work?
>
> Are the students able to operate equipment under their control?
>
> Is the installation located in a pleasant environment and one that is conveniently situated for the students?
>
> Is the lab. personnel interested and helpful?
>
> Is the equipment in constant working order?
>
> Is the technical quality of the recorded material satisfactory?

When visual media and material play an important part in self-instructional language projects, similar observations of detail will be appropriate with the facilities and equipment concerned.

Account of media used should go beyond a description of the instrument employed (hardware) to explore the nature of the instructional material (software) for the instrument, as well as interaction between these. An analysis of software should take specific account of elements of design and display (attention-catching devices, clarity, relevance, variety).

Investigations in which attention is directed specifically to the effects of different media call for a media-specific design. Since the object of such an investigation is to determine effects of the media rather than those of the programme, the design should have a theoretical framework in which a specific relationship is hypothesized between a given medium and a particular outcome. For example, a theory of language teaching holding that the learning of linguistic units involves spatial and temporal imagery (Strømnes, 1973) might be tested using film or animated cartoon. A limited example on these lines is Kopstein & Roshal's

(1961) study of the effectiveness of pictorial material as compared with verbal material in the learning of Russian lexical items.

It is evident that investigations concerned solely with proving the effectiveness of a particular medium, e.g. those undertaken to allow decisions on whether or not to employ a particular teaching device or teaching machine, have no generalizability, as Lumsdaine (1963) has observed.

The emphasis in this section on description of environmental variables is not intended to suggest that this is a satisfactory substitute for rigorous study of the effect of the variables on individual students and hence on individual outcomes. At present, however, environmental variables are not even described in published reports. The whole area awaits fundamental research. In the writer's view, such research should properly begin with investigation in depth of the experience of individuals working with programmed language materials.

6. ADMINISTRATION

Description of the learning environment of a project of programmed instruction involves, in addition to an accurate description of the media of instruction, an account of the following factors (compare Lumsdaine, 1963).

1. Directives given for work on the programmes.
2. Group-paced or individually paced instruction.
3. Time devoted to work on the programme by each student.
4. Mode of supervision of student progress.
5. Measures of incentive.

6.1. Directives

How are students informed about the administration and requirements of the project? To avoid a serious source of error, namely misinformation, measures must be taken to guarantee that each student knows what he is expected to do (in what place, by what time, in what order, etc.).

Suitable redundancy of information can be achieved by using several communication channels (print, lecture,

individual instructions) and by repeating the information at intervals. Feedback to the administrator, i.e. knowledge of the degree to which information presented was received and understood and of the form in which it was understood, is one of prerequisites of meaningful evaluation.

6.2. Group-paced or individually paced instruction

Where instruction is group-paced, that is, where there is some compulsion on all students to complete given amounts of the programme within a given time and consequently to work right through the programme, some investigators limit themselves in evaluation to the question of what the students have learned. Since, however, group-paced instruction, particularly when achieved through compulsory attendance at language lab. sessions, may adversely affect the motivation of individual students, information should be sought on this as an affective variable. Both rapid and slow achievers may be affected. Positive motivational effects of group-paced instruction could also be investigated with language programmes.

Where instruction is individually paced, achievement following work on the programme must be related to how much of the programme each individual was exposed to, as well as with what intensity or periodicity he worked on the programme. Working through ten units in one day, for example, is a different learning experience from working on the same ten units over ten successive days.

6.3. Time

It is of particular interest in language programmes containing self-evaluating frames (e.g. mimicry, transformational and free response frames) to know the amount of time spent on each unit by each individual. Thus, when administration is not group-paced, information should be sought not only on how much of the programme each student went through at what intervals, but also how much time was spent on each unit.

It should be noted that measurement of time in work with linear programmes is not meaningful, time being here equivalent to amount of programme taken. Few language programmes, however, are purely linear. Programmes containing frames of the type of Carroll's "practice loops" (Carroll, 1963) suggest application of time criteria.

6.4. Mode of supervision

If student progress during the course of instruction is under observation, i.e. over the period preceding a final achievement test, these questions need to be clarified:

Is the course broken up into units, with progress tests (formative tests)?

How are such tests administered?

What kind of information is given to students on the basis of formative test results?

Are students permitted to proceed when their achievement on formative tests has not reached the criterion?

If they are permitted to proceed, what advice is given them?

What directives are given for remedial and supplementary self-instruction?

With the considerations above compare Block (1971) and Bloom, Hastings & Madaus (1971).

It must be ascertained in investigation whether such external supervision extends to instruction in subject matter, in which case parallel teacher-led instruction becomes the variable concerned (Section 3.6.).

6.5. Incentive measures

A major method of providing study incentive during self-instruction is the provision of formative evaluation (Bloom, Hastings & Madaus, 1971) referred to above. Other forms of incentive are:

encouraging comment built into the programme at the end of certain units, typically beginning with the phrase, "Congratulations, you have now .."

progress charts displayed publically (Robson, 1967)

requiring students to report progress at fixed intervals, e.g. weekly, to a tutor who records progress (and may provide verbal encouragement)

individual tutoring, either limited to guidance and encouragement or else extending to parallel teacher-led instruction

arranging for work on the programme to be done in pairs, possibly matched on ability and personality (Robson, 1967)

intrinsic interest of the instructional material (Marty, 1962)

7. PARALLEL TEACHER-LED INSTRUCTION

Projects of programmed language instruction rarely feature total self-instruction. Either informal guidance is provided throughout the course or formal classes are arranged parallel to work on the programme. This aspect of projects is evidently a major variable, and detailed observation of the classroom situations or tutoring are needed.

To what extent, for instance, does parallel classroom instruction remedy deficiencies of the programme? Does it serve as a remedial session for those who work less successfully with the programme? Or does it provide living practice in the language material taught in the programme (and thus serve also the student who works well with the programme)?

These questions were approached in a questionnaire by Mueller & Miller (1970), who asked students to compare the efficacity of programme and classroom work. Their report, however, gives almost no information on what took place in the classroom. Detailed observations are needed (Williams, 1956; Wallen & Travers, 1963), which could be compared with results of attitude study.

Where teacher participation is informal, as when the teacher acts as a tutor and guide while the student is working through the programme, his role can be defined by asking such questions as:

> Does the teacher actively intervene in the learning process (attempting to improve or supplement the presentation of the programme)?
>
> Or does he give advice only when asked?
>
> Is his advice restricted to administrative features of the self-instructional system?
>
> Or does he attempt to diagnose and predict faulty performance, arrange extra practice, etc.?

Evidently the tutor's role is important in motivation. Observation and opinion survey might answer such questions as:

> Is the tutor approachable and helpful?
>
> Is he competent to give help? In American projects, he is often a graduate student, not an experienced teacher (Clark, 1968).
>
> Does he take the programme seriously and encourage students to do their best on it?
>
> Does he reveal any attitudes towards the language and its culture or towards the programme that might influence motivation or attitude?

If the teacher is himself in charge of operating the media of instruction, his use of these instruments must be controlled. It is possible, for instance, to convey to students positive or negative attitudes towards equipment being used to convey instruction.

8. STATEMENT OF OBJECTIVES AND EVALUATION OF ACHIEVEMENT

This section considers some approaches to the problem of evaluating achievement in the complex learning situation involved in programmed language instruction. Sections 8.1. - 8.4. introduce a new approach to the problem of stating objectives for language instruction and Section 8.5. discusses the selection, use, interpreting and reporting of criterion measures in this field.

In order to evaluate achievement on a language programme, the general goals and specific objectives of language instruction must be specified. Disagreement on the nature of the subject matter, reflected in the conflicting schools of linguistics, and disagreement on how best to analyse and order units of language instruction have impeded the development of clearly stated goals and objectives. An attempt is made in this section to suggest some guidelines for a better definition of language teaching goals and objectives, with the specific purpose of facilitating the measurement of achievement on language programmes.

8.1. Language teaching goals

To begin speaking about goals, a broad statement is needed of the aims of instruction in a foreign language. The following, for instance:

1. to produce in the student such mastery of the phonetic, lexical, grammatical and semantic sub-systems of the language as will enable him at varying levels to understand the language in its spoken and written modes (the receptive area) and to create meaningful utterances and written sentences (the productive area).

The levels should be specifically defined in terms of range (i.e. the specific sounds, grammatical structures, lexical items and meanings required for performance in stated areas) while the criteria of mastery should be specified in terms of comprehension and speed in the receptive area and comprehensibility and fluency in the productive area.

If a statement of this kind is compared with the requirements made of instruction in other subjects, some salient features of language teaching appear. Firstly, there is a great emphasis on transfer: mastery is judged on the ability to comprehend material never previously encountered and to produce wholly new utterances or written sentences. Secondly, allied to this, mastery is revealed in manipulation of units of learning, and this manipulation is operational rather than discrete (i.e. no one facet of learning will alone permit comprehensibility or understanding). Thirdly, for the spoken language there is a time component present in the criteria of mastery.

A consequence of this comparison is that any language instruction should, as well as providing a presentation of items of the sub-systems for understanding or production, also attempt:

2. to ensure optimal transfer to new material
3. to provide adequate practice in manipulating items already taught
4. to regularly call upon all such items in operational tasks performed at stated speed.

These four statements are the broad requirements on which a statement of the goals of any language instruction could be based. The goals relevant to a particular situation will vary in their relative emphasis on the receptive and productive areas and in the levels and criteria of mastery expected.

Progress towards satisfactory evaluation of achievement in programmed language instruction requires more detailed specification of aims, namely the statement of specific instructional objectives for all units of instruction concerned.

8.2. Language teaching objectives and the Taxonomy of educational objectives

Although the importance of stating objectives with maximum explicitness is widely recognized in both classroom teaching and automated instruction (Gagné, 1965), reports on trials of language programmes rarely make mention of the objectives of the programme. In the investigations surveyed by Black (1974) there was no specification of objectives in any report.

Four main reasons for specifying objectives of instruction are:

1. to enable the programme writer to plan and design his work purposefully (Mager, 1962b)

2. to make possible a measurement of learning effected by work on the programme, including a measure of how much was learned and how well something was learned (Mager, 1962b)

3. to distinguish between classes of terminal behaviour (Gagné, 1965; Stolurow, 1961; Davies, 1968)

4. to give the learner control over his activity in working through the programme. Such control is conceived either as programming one's own activity (Mager & McCann, 1961) or implementing reinforcement (Gagné, 1962; Davies, 1968).

One possible reason why language programming and language teaching generally have been so slow to implement nearly three decades' work in the field of instructional objectives is the difficulty of adapting to this subject matter categories worked out for such subjects as physics and mathematics. A comparison of the adaptation to such fields of the Taxonomy of educational objectives (Bloom, 1956; Krathwohl, Bloom & Masia, 1964) presented in the compendium of evaluation of Bloom, Hastings & Madaus (1971) with that made to language teaching in the same volume by Valette (1971) illustrates this point.

The Taxonomy has been criticised (Gagné, 1965) for failing to state its own categories with sufficient precision and for allowing possible confusion between the categories. This criticism does not seem justified when applied to rigorous adaptations to particular subject fields, such as many of those in Bloom, Hastings & Madaus (1971). An adequate adaptation of the Taxonomy would seem an important contribution to classroom and automated instruction in the language field.

The categories of the taxonomy of the cognitive domain are presented below in outline.

1. KNOWLEDGE

   of specifics, or ways of dealing with specifics, of universals and abstractions.

2. COMPREHENSION

   Ability to paraphrase, to interpret and to extrapolate from given data.

3. APPLICATION

   Use of principles or ideas.

4. ANALYSIS

   of elements, of relationships and of organizational principles.

5. SYNTHESIS

   Producing new structures from known data or phenomena.

6. EVALUATION

   Critical judgement in the subject field.

(Summarized from Bloom, 1956)

8.3. Adaptation of the Taxonomy to language teaching by Valette (1971)

In a first adaptation of the Taxonomy to language teaching, Valette (1971) set out the three classes shown in Table 3. Only one of these categories, 1. Knowledge and perception, corresponds to those of the original taxonomy.

Table 3. Adaptation of the Taxonomy of educational objectives, cognitive domain to language teaching by Valette, 1971.

1.0 KNOWLEDGE AND PERCEPTION
1.1. knowledge of elements
1.2. ability to differentiate and discriminate among elements
1.3. knowledge of rules and patterns
1.4. ability to differentiate and discriminate among rules and patterns
2.0 MANIPULATION
2.1. ability to reproduce elements and patterns
2.2. ability to manipulate elements and patterns
3.0 UNDERSTANDING AND PRODUCTION
3.1. ability to grasp explicit meaning of utterances or patterns
3.2. ability to produce utterances or patterns conveying explicit meaning
3.3. ability to analyse utterances or patterns in terms of implicit meaning
3.4. ability to analyse (sic) utterances or patterns conveying implicit meaning

Presumably the word analyse in 3.4. is a misprint for produce.

This adaptation can be criticised on two grounds.

Firstly, it has not retained the range and fineness of analysis of the Taxonomy. There are only three main classes instead of six, and these three classes do not represent a meaningful progression of learning. For example, it would be hard to imagine a sequence of instruction that remained within categories 1 and 2 for any considerable period, for these two categories exclude meaning. Meaning is introduced only in category 3, but in fact the "ability to grasp explicit meaning of utterances or patterns" is fundamental to language teaching. This ability is surely to be taught in connection with the teaching of "knowledge of elements ... patterns". On the other hand, implicit meaning (3.3. and 3.4.) is part of an advanced language ability, normally presupposing several years of study. The classification from 1.1 to 3.2 concerns, then, the most basic language instruction, while the two sub-classes 3.3 and 3.4 introduce the most advanced levels. Further, the concepts analysis, synthesis and evaluation have been lost from the original Taxonomy.

The second criticism is that this adaptation has not used the Taxonomy to make a new analysis of the subject, but has taken existing categories of the Audio-lingual method (compare Lado, 1964) and forced them, with some alterations of terminology, into a framework derived from the Taxonomy. Giving new names to an existing method of instruction does not achieve the function of developing more precise categories of subject matter for a more consequent sequencing of instruction, which is a fundamental purpose of the Taxonomy (Bloom, 1956).

8.4. An alternative adaptation (Black, 1972)

The attempt described in this section to adapt the Taxonomy more faithfully and, in so doing, to define more precise categories of language instruction than are otherwise available begins from the broad statement of language teaching goals made in Section 8.1. Given such general aims, how can the smaller units of this subject matter be so defined as to allow a meaningful adaptation of the Taxonomy?

Work on a similar analysis of the communication process (Shannon & Weaver, 1959) and, more particularly, an analysis of language as a symbol system by Strømnes (1969, 1973) has suggested units of analysis which appear to allow a consequent adaptation of the Taxonomy.

An obvious difference from such subjects as physics or economics is that in teaching a language one aims at

mastery of a symbolic system of communication. Each such system consists of symbols (e.g. nouns, verbs), operator-symbols or operators (e.g. inflections, prepositions, conjunctions), operations (e.g. phrases, sentences) and conventions governing the operations (e.g. conventions of word order). The operators are combined with symbols, with other operators or with operations.

The teaching of a system so defined can now be ordered in the categories of the Taxonomy (Table 4).

Table 4. An alternative adaptation of the Taxonomy of educational objectives, cognitive domain, to second-language teaching (Black, 1972).

1.0 KNOWLEDGE

1.1. ability to discriminate or produce individual sounds (and letters, if an unfamiliar script is involved)

1.2. knowledge of lexical items (symbols), i.e. nouns, pronouns, verbs, adjectives, adverbs, and their meanings

1.3. knowledge of phonetic structures, morphological forms, prepositions, conjunctions, articles, etc. (operators) and their meanings

1.4. knowledge of phonetic and spelling changes caused by junction of symbols and operators (e.g. inflections)

1.5. knowledge of restrictions on operations (e.g. formation of phrases and sentences) by conventions (e.g. of word order)

2.0 COMPREHENSION

ability to perceive what is being communicated by operations of a given degree of complexity, at a given speed in the case of speech

2.1. Translation

ability to translate or paraphrase information communicated in the second language

2.2. Interpretation

ability to ponder the message communicated

2.3. Extrapolation

ability to respond meaningfully to the message communicated

3.0 APPLICATION

ability to produce in speech and writing combinations of symbols and operators that will convey information to a receiver, at stated speed for the spoken language

4.0 ANALYSIS

ability to draw upon knowledge of operations of all kinds so as to interpret complex language use (e.g. emotional or stylistic levels)

4.1. Analysis of elements

examples: ability to perceive expressive intonation, to note ambiguity or confusion of speech levels

4.2. Analysis of relationships

examples: ability to relate emotional or stylistic elements to their context in speech or writing

4.3. Analysis of organizational principles

ability to infer speaker's or writer's intention from his use of emotional or stylistic elements

5.0 SYNTHESIS

Creative use of language (ability to speak or write humorously, persuasively, dramatically, etc)

6.0 EVALUATION

Critical judgement of speech or writing in the second language, e.g. on stylistic criteria

Each category of the taxonomy presupposes mastery of the preceding category or categories. This does not mean that in practice one should teach all the specifics of category 1.0 Knowledge before proceeding to category 2.0 Comprehension, but that it is useless to try to achieve an ability in the second category before appropriate specifics from category 1.0 have been mastered.

For example, the "ability to respond meaningfully to the message communicated" (2.3) by a complex operation (e.g. a long sentence) presupposes knowledge of the symbols (1.2) and operators (1.3) of which the operation is composed (e.g. its nouns, verbs and inflections, tenses) as well as of conventions (1.5) which may govern this composition.

In order to plan the teaching of knowledge and ability listed in the taxonomy, detailed and unambiguous objectives should be prepared on the basic framework. There is a growing body of literature on the writing of educational objectives, of which Mager (1962) and Gronlund (1970) are representative.

8.5. Criterion measures of achievement

Criterion measures of achievement can be applied at three temporal stages:

1. during work on the programme
2. at completion of the programme
3. after a delay following completion of the programme (measurement of retention and transfer)

Measures of student behaviour during work on the programme applied in some investigations (Lumsdaine, 1963) have been:

1. over-all error rate, i.e. errors made on all practice frames and all revision frames
2. rate of error on revision frames only.

The latter measure avoids the effect of prompting in a given sequence of frames (sequence prompting).

The relevance of such measures appears questionable. It is possible to reduce error rate to a minimum, even in review frames, through a high ratio of prompting. This result, however, may not be related to programme effectiveness, especially as error rate is a factor of the particular programming strategy employed, non-branching programmes showing a characteristically low error rate.

Direct observation of individual students (frame by frame testing), a standard procedure in programme construction (Markle, 1967), is a source of information rarely tapped in larger investigations. Where highly specific post-test measures of evaluation are used, observation and report of student experience can be correlated with achievement. A source of error here is possible heightened motivation in observed or reporting students.

In assessing effects with a criterion measure, full account must be taken of testing conditions. This includes, for

oral-aural language testing, account of audio equipment, acoustical properties of the testing environment, compensation for individual deficiencies of hearing, extraneous noise and interruption. These features, in addition to all the standard test characteristics, should be fully reported by investigators. This is rarely the case in reports of language teaching investigations.

Where measurement of retention is attempted, two approaches are commenly used:

1. re-application of the criterion after an interval
2. assessment of time needed in re-training to again attain the criterion after an interval (assessment of savings, Lumsdaine, 1965).

An acute problem in the latter procedure is what vehicle of instruction to choose for the refresher training involved.

Measurement of transfer effects from training in specific aspects of language skills involves the testing of higher level (operational) skills. For example, transfer of training in pronunciation to a speech situation may be assessed in tests of oral composition. Testing of higher-level language skills, with its many problems of scorer reliability and administration, is discussed in Berggren (1970) and Robinson (1971).

Standardized tests have frequently been chosen as the criterion for investigation of both programmed (e.g. Valdman, 1964) and classroom instruction (e.g. Smith, 1970) in the United States, where the Modern Language Association's standardized tests (Bures, 1965) are available. However, it is evident that tests developed externally cannot be considered a relevant measure of attainment of the specific objectives of a given programme. Values obtained from such a measure indicate to what extent the students under investigation have attained skills measured by the M.L.A. tests, but do not indicate at all other possible outcomes of the particular instruction received. It seems surprising that this criticism should not have been foreseen by investigators of programmed instruction.

At present, the investigator will normally have to construct and validate his own highly specific measures. Construction of language tests is the subject of a growing literature, of which Harris (1969) and Valette (1967) are representative.

Interpretation of criterion measures is often made difficult by the use in the investigation of relative scales whose meaning, in reference to an external criterion, remains undefined. Reporting, for example, a significant improvement (pre-test/post-test) in units of a relative scale does not in itself provide meaningful information.

Likewise in comparisons of achievement where one group receives programmed instruction and the other no instruction, with the design:

$$O_1 \text{ —— } X \text{ —— } R_1$$

$$O_2 \text{ ———— } R_2$$

a statistical comparison of values obtained from a relative scale is not sufficient.

Use of the null hypothesis in comparisons of achievement following work with instructional media was criticised by Lumsdaine (1963), who reviewed the extensive literature to that date on television and film. He commented that the question to be determined in the use of media is not whether a programme taught something to a degree differing significantly from chance expectancy but how much it taught according to a meaningful criterion.

To have a criterion of this kind for use with programmed language instruction, it would be necessary to construct and validate standardized measures of achievement of highly specific language teaching objectives of the type proposed in Section 8.4. This consequent approach to the problem of evaluation of achievement in programmed language instruction would have important consequences for language teaching generally, as the ideal situation would be reached where language instruction was aware of its aims, was able to make them known to the learner and was able to verify subsequently that the aims had been attained to such and such a degree.

9. MEASUREMENT OF ATTITUDE AND MOTIVATION

This chapter outlines some of the predictable variables in the three major classes into which attitude and motivation in this subject matter can be analysed: attitude towards the programme, towards language study and towards the particular language and its culture.

Reviewing research on student attitudes to foreign language instruction, Birkmaier (1973) noted that for American college students achievement in foreign language study is not a central goal. Moreover, foreign language achievement is not approved of as a college requirement by a majority of U.S. students.

This observation emphasizes the importance of assessing attitude and motivation in investigations of language instruction. All the large-scale investigations of achievement in language learning have been carried out in the United States (i.e. Agard & Dunkel, 1948; Scherer & Wertheimer, 1964; Chastain & Woerdehoff, 1968; Smith, 1970), but of these only Smith studied attitude, and he did not integrate his survey of attitudinal change with assessment of achievement. If there is a great likelihood that the populations on which these investigations were carried out held marked negative attitudes towards the subject of instruction, it is hard to know what confidence to place on the results of the studies or to judge what relevance these results may have for populations with a different motivational structure (as may be the case with European students).

The predictable affective outcomes of a programmed language course and the attitudinal variables that the individual brings to this learning situation can be grouped in three main classes:

1. attitudes towards the programme or towards programmed instruction
2. attitudes towards language learning
3. attitudes towards the foreign language and its culture.

There is some evidence (Lambert et al., 1963) that language learning involves an assimilation of modes of behaviour of another linguistic-cultural group, a process that not every individual is willing to undergo. A possibility, according to Lambert, is that the successful student of a foreign language is an individual who experiences dissatisfaction with his own linguistic-cultural group and seeks affiliation with another. To follow this thought to its extreme conclusion is to say that classes 2 and 3 above are indistinguishable.

An alternative interpretation of Lambert et al.'s findings is that the experience of becoming bilingual disposes a student to become bicultural (Birkmaier, 1973).

A number of key questions in each of the three classes are set out in Sections 9.1. - 9.3. One task of evaluation is to determine the state of these affective variables at outset and on completion of the programme. Another is to determine relationships between initial attitudes and achievement on the course and change in attitude and achievement on the course.

9.1. Attitudes towards the programme

Does the student have a favourable attitude towards programmed learning?

What experience has he had of programmed learning?

What preconceptions does he have of programmed instruction? Of programmed language instruction?

How does he experience the programme along the dimensions:

difficult - easy
uninteresting - interesting
unrewarding - rewarding
irrelevant - relevant

How does he experience the learning situation in respect to:

administration
equipment and materials
social contacts

9.2. Attitudes towards language learning

Does the student experience language learning as relevant to his social, economic or career needs?

Does learning a foreign language fulfil such personal needs as:

having contact with another culture
being able to indentify with members of another culture
having the possibility of entering another culture?

Has he experienced success in language learning?
Does he now anticipate success in learning the language in question?

9.3. Attitudes towards the target language and its culture

Does the student have a favourable attitude towards the linguistic-cultural group concerned?

Does he show interest in this group?

What stereotypes does he have concerning this group?

What contacts has he had with this group?

What attitudes does he have towards his own linguistic-cultural group?

10. SUMMARY

A critical review by Black (1974) of some typical investigations of programmed language instruction suggested that there are a number of critical areas for research of this kind that are frequently not given adequate attention by investigators. The analysis of these critical areas is developed in the present study, the general aim of which is to provide the foundation work for a model of research in this area.

The existence of a model for the investigation of programmed language instruction would mean that during a project of programmed instruction account could be taken of all factors having an important influence on the course of language learning, either by controlling these variables or by incorporating them into the design of the investigation.

Chapter 2 attempts to present a synthesis of all the critical features analysed by sketching a preliminary model. At this stage, the outline of such a model can only be tentatively suggested, but as a concrete proposal a full model for one typical investigation, the study of media effects, is presented.

Chapter 3 begins with a schematization of instructional process variables relevant to language programming and proceeds to analyse each category (input variables, intermediate process variables and output variables) of the scheme in some detail.

Chapter 4 critically examines the two major programming strategies (linear and intrinsic programming) in respect to their relevance of application to language instruction.

Chapter 5 classifies the components of single medium and multi-media technology available for language instruction and proposes a systematic description of media as part of the language learning environment.

Chapter 6 analyses five variables in the administration of programmed instruction: study directives, pacing of instruction, study time, mode of supervision, incentive measures.

Chapter 7 discusses formal and informal teacher participation and the influence of this participation on learner motivation.

Chapter 8 approaches the question of evaluation of achievement on language programmes through the analysis of goals and objectives of programmed language instruction. Only when specific language teaching objectives are stated can evaluation determine the success of the programmed instruction. The contribution made here to the problem of stating language teaching objectives is an adaptation of the Taxonomy of educational objectives (Bloom, 1956) to language instruction. The section concludes with a discussion of the selection, use and interpreting of criterion measures of evaluation of achievement on language programmes.

Chapter 9 outlines three areas of attitude study relevant to investigation of programmed language instruction: attitude towards the programme, attitude towards language learning and attitude towards the target language and its culture.

REFERENCES

Agard, F.B. & Dunkel, H.B., An investigation of second-language teaching. Boston, 1948.

Aleamoni, L.M. & Spencer, R.E., An evaluation of the Pennsylvania foreign language project. Modern Language Journal, 53 (1969), 421-428.

Berggren, O., Kielten opetus 70-luvulla. Porvoo 1970.

Best, J.W., Research in education. Englewood Cliffs, 1970.

Birkmaier, E.M., Research on teaching foreign languages. In R.M.W. Travers (Ed.), 1973, 1280-1302.

Black, C., A taxonomy of language teaching objectives. Audio-visual Language Journal, 10 (1972), 138-140.

Black, C., Ovatko korrektius ja kommunikaatio keskenään ristiriidassa? In P. Hirvonen (Ed.), 1972b, 21-25.

Black, C., Towards a meaningful investigation of programmed language instruction. IRAL, 12 (1974), 103-118.

Block, F.H., (Ed.), Mastery learning: theory and practice. New York, 1971.

Bloom, B.S. (Ed.), Taxonomy of educational objectives. Handbook 1: cognitive domain. New York, 1956.

Bloom, B.S., Hastings, J.T., & Madaus, G.F., Handbook on formative and summative evaluation of student learning. New York, 1971.

Bung, K. (Ed.), Programmed learning and the language laboratory, 1. London, 1968.

Bung, K., Towards truly programmed language laboratory courses. Audio-visual Language Journal, 7 (1969), 5-17.

Buros, O.K. (Ed.), Sixth mental measurements yearbook. Highland Park, 1965.

Carroll, J.B., A primer of programmed language instruction in foreign language teaching. IRAL, 1 (1963), 115-141.

Carroll, J.B., Contributions of psychological theory and educational research to the teaching of foreign languages. In A. Valdman (Ed.), 1966, 93-106.

Chastain, K.D. & Woerdehoff, F.J., A methodological study comparing the audio-lingual habit theory and the cognitive code-learning theory. Modern Language Journal, 52 (1968), 268-279.

Clark, J.D., The Pennsylvania project and the "audio-lingual" versus "traditional" question. Modern Language Journal, 53 (1969), 388-396.

Clark, W.H., Using programmed language courses in college. In t.H. Mueller (Ed.), 1968, 11-17.

REFERENCES

Agard, F.B. & Dunkel, H.B., An investigation of second-language teaching. Boston, 1948.

Aleamoni, L.M. & Spencer, R.E., An evaluation of the Pennsylvania foreign language project. Modern Language Journal, 53 (1969), 421-428.

Berggren, O., Kielten opetus 70-luvulla. Porvoo 1970.

Best, J.W., Research in education. Englewood Cliffs, 1970.

Birkmaier, E.M., Research on teaching foreign languages. In R.M.W. Travers (Ed.), 1973, 1280-1302.

Black, C., A taxonomy of language teaching objectives. Audio-visual Language Journal, 10 (1972), 138-140.

Black, C., Ovatko korrektius ja kommunikaatio keskenään ristiriidassa? In P. Hirvonen (Ed.), 1972b, 21-25.

Black, C., Towards a meaningful investigation of programmed language instruction. IRAL, 12 (1974), 103-118.

Block, F.H., (Ed.), Mastery learning: theory and practice. New York, 1971.

Bloom, B.S. (Ed.), Taxonomy of educational objectives. Handbook 1: cognitive domain. New York, 1956.

Bloom, B.S., Hastings, J.T., & Madaus, G.F., Handbook on formative and summative evaluation of student learning. New York, 1971.

Bung, K. (Ed.), Programmed learning and the language laboratory, 1. London, 1968.

Bung, K., Towards truly programmed language laboratory courses. Audio-visual Language Journal, 7 (1969), 5-17.

Buros, O K. (Ed.), Sixth mental measurements yearbook. Hig nd Park, 1965.

Carroll, J.B., A primer of programmed language instruction in foreign language teaching. IRAL, 1 (1963), 115-141.

Carroll, J.B., Contributions of psychological theory and educational research to the teaching of foreign languages. In A. Valdman (Ed.), 1966, 93-106.

Chastain, K.D. & Woerdehoff, F.J., A methodological study comparing the audio-lingual habit theory and the cognitive code-learning theory. Modern Language Journal, 52 (1968), 268-279.

Clark, J.D., The Pennsylvania project and the "audio-lingual" versus "traditional" question. Modern Language Journal, 53 (1969), 388-396.

Clark, W.H., Using programmed language courses in college. In t.H. Mueller (Ed.), 1968, 11-17.

Corder, S.P., The visual element in language teaching. London, 1966.

Coulson, J.E. & Silbermann, H.F., Effects of three variables in a teaching machine. Journal of Educational Psychology, 51 (1960), 135-143.

Crowder, N.A., On the difference between linear and intrinsic programming. Phi Delta Kappan, 44 (1963), 250-259.

Davies, A. (Ed.), Language testing symposium: a psycholinguistic approach. London, 1968.

Davies, I.K., The mathetics style of programming. In K. Bung (Ed.), 1968, 29-48.

Gage, N.L. (Ed.), Handbook of research on teaching. Chicago, 1963.

Gagne, R.M., The acquisition of knowledge. Psychological Review, 69 (1962), 355-365.

Gagne, R.M., The analysis of instructional objectives for the design of instruction. In R. Glaser (Ed.), 1965, 21-65.

Gagne, R.M. & Bassler, O.C., Study of retention of some topics of elementary nonmetric geometry. Journal of Educational Psychology, 54 (1963), 123-131.

Glaser, R., Psychology and instructional technology. In R. Glaser (Ed.), 1962, 1-30.

Glaser, R. (Ed.), Training research and education. Pittsburg, 1962.

Glaser, R. (Ed.), Teaching machines and programmed learning, II. Washington, 1965.

Gronlund, N.E., Stating behavioral objectives for classroom instruction. London, 1970.

Harris, D., Testing English as a second language. New York, 1969.

Hartley, J., Research report. New Education, 2 (1966), 29-35.

Hirvonen, P., Englannin kielen taidon mittaaminen lukion päättyessä: 1. Lähtökohdat. Suomen Sovelletun Kielitieteen Yhdistyksen julkaisuja, 1, 1971.

Hirvonen, P. (Ed.), Tätä mieltä kielten opetuksesta. Suomen Sovelletun Kielitieteen Yhdistyksen julkaisuja, 5, 1972.

Holland, J.G., Research in programming variables. In R. Glaser, (Ed.), 1965, 66-117.

Holland, J.G. & Skinner, B.F., The analysis of behavior. New York, 1961.

Howatt, A., The cyclical principle in foreign language programming. Programmed Learning and Educational Technology, 4 (1967), 185-190.

Ingram, E., Attainment and diagnostic testing. In A. Davies (Ed.), 1968, 70-97.

Kopstein, F.F. & Roshal, S.M., Verbal learning efficiency as influenced by the manipulation of representational response processes: pictorial, verbal and temporal contiguity factors. In A.A. Lumsdaine (Ed.), 1961, 335-350.

Krathwohl, D.R., Bloom, B.S. & Masia, B.B., Taxonomy of educational objectives. Handbook 2: affective domain. New York, 1964.

Lado, R., Language teaching: a scientific approach. New York, 1964.

Lambert, W.E. et al., Attitudinal and cognitive aspects of intensive study of a second language. Journal of Abnormal and Social Psychology, 66 (1963), 358-368.

Landa, A., Algorithms and programmed learning. In K. Bung (Ed.), 1968, 57-132.

Lane, H., Programmed learning of a second language. IRAL, 2 (1964), 249-301.

Lange, P.C. (Ed.), The sixty-sixth yearbook of the National Society for the Study of Education, part II, Chicago, 1967.

Lumsdaine, A.A., Instruments and media of instruction. In N.L. Gage (Ed.), 1963, 583-682.

Lumsdaine, A.A. (Ed.), Student response in programmed instruction. Washington, 1961.

Lumsdaine, A.A. & Glaser, R. (Eds.), Teaching machines and programmed learning, I. Washington, 1960.

Lyons, J., Introduction to theoretical linguistics. Cambridge, 1968.

Mager, R.F., On the sequencing of instructional content. Psychological Reports, 9 (1961), 405-413.

Mager, R.F., Preparing instructional objectives. Palo Alto, 1962.

Mager, R.F., Preparing objectives for programmed instruction. Fearon, 1962b.

Mager, R.F. & McCann, J., Learner-controlled instruction. Palo Alto, 1961.

Markle, S.M., Empirical testing of programmes. In P.C. Lange (Ed.), 1967, 104-138.

Markle, S.M., Good frames and bad. New York, 1964.

Marty, F., Programming a basic foreign language course. Roanoke, 1962.

Miller, R.B., Analysis and specification of behavior for training. In R. Glaser (Ed.), 1962, 31-62.

Morton, F.R., The Lindenwood experiment: the trial use of the ALLP-II Spanish self-instructional program as the sole instructional medium for first-year Spanish students in a liberal arts college. New York, 1965.

Mueller, T.H. (Ed.), Proceedings of the Seminar on programmed learning. New York, 1968.

Mueller, T.H. & Miller, R.J., A study of student attitudes and motivation in a collegiate French course using programmed language instruction. Iral, 8 (1970), 297-320.

Ornstein, J., Programmed learning and instructional technology in the language teaching field: new approaches to old problems. Philadelphia, 1971.

Pimsleur, P., Experimental design in the language field. Modern Language Forum, 42 (1957), 157-163.

Postman, L. & Keppel, G. (Eds.), Verbal learning and memory. London, 1969.

Rivers, W., The psychologist and the foreign language teacher. Chicago, 1964.

Robinson, P., Oral expression tests. English Language Teaching, 25 (1971), 151-155, 260-266.

Robson, G.A., Group integration without group interference: a method of presenting programmed instruction. In D. Unwin & J. Leedham (Eds.), 1967, 523-531.

Roeske, E., Ist Sprachlaborarbeit programmiertes Lernen? Praxis des neusprachlichen Unterrichts, 13 (1966), 366-372.

Rommetveit, R., Words, meanings and messages. New York, 1968.

Rosenberg, S. (Ed.), Directions in psycholinguistics. New York, 1965.

Scherer, G.A.C. & Wertheimer, M., A psycholinguistic experiment in foreign-language teaching. N.Y., 1964.

Shannon, C.E. & Weaver, W., The mathematical theory of communication. Urbana, 1959.

Skinner, B.F., Teaching machines. In A.A. Lumsdaine & R. Glaser (Eds.), 1960, 137-158.

Smith, P.D., A comparison of the cognitive and audio-lingual approaches to foreign language instruction: the Pennsylvania Foreign Language Project. Philadelphia, 1970.

Stolurow, L.M., Teaching by machine. Washington, 1961.

Strømnes, F.J., A semiotic theory of imagery processes with experiments on an Indo-European and a Ural-Altaic language: do speakers of different languages experience different cognitive worlds? Scandinavian Journal of Psychology, 14 (1973), 291-304.

Strømnes, F.J., Keskellä metsää. In P. Hirvonen (Ed.), 1972, 71-73.

Strømnes, F.J., Prolegomena to a theory of semiotics. Stockholm, 1969.

Travers, R.M.W. (Ed.), Second handbook of research on teaching. Chicago, 1973.

Unwin, D. & Leedham, J. (Eds.), Aspects of educational technology. London, 1967.

Valdman, A., Toward self-instruction in foreign language learning. IRAL, 2 (1964), 1-36.

Valdman, A. (Ed.), Trends in language teaching. New York, 1966.

Valette, R.M., Evaluation of learning in a second language. In B.S. Bloom, J.T. Hastings & G.F. Madaus, 1971, 815-853.

Valette, R.M., Modern language testing. New York, 1967.

Wallen, N.E. & Travers, R.M.W., Analysis and investigation of teaching methods. In N.L. Gage (Ed.), 1963, 448-505.

Williams, J.D., Some problems involved in the experimental comparison of teaching methods. Educational Research, 8 (1956), 26-41.

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Tutkimuksessa keskitytään teoreettisesti tarkastelemaan ohjelmoidun kielenopetuksen mielekkääseen tutkimukseen liittyviä ongelmia. Tarkoitus on muotoilla tutkimusmalli rajaamalla kahdeksan ongelma-aluetta, joiden huomioonottaminen on välttämätöntä luotettavan tutkimustiedon saamiseksi. Nämä ongelma-alueet voidaan ryhmitellä seuraavasti: koeasetelma, muuttujat, ohjelmointistrategiat, opetusvälineet, koejärjestelyt, rinnakkainen opettajajohtoinen opetus, tavoitteiden määrittäminen, oppimistulosten arviointi sekä opiskelijoiden asenteiden ja motivaation mittaaminen. Näitä ongelmapiirejä hahmottamalla ja jäsentämällä on pyritty luomaan pohjaa ohjelmoidun kielenopetuksen tutkimusmallille.

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